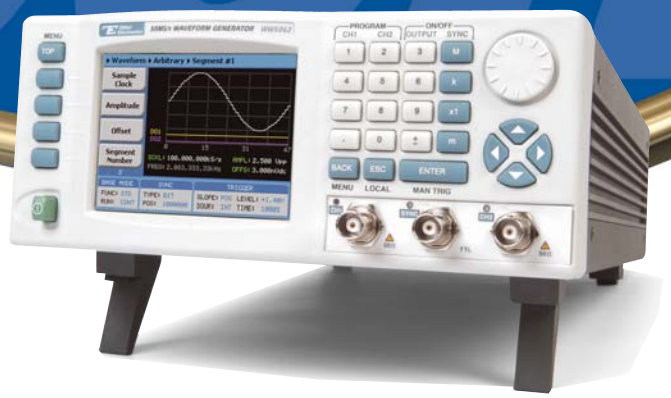
50MS/s Dual-Channel Arbitrary Waveform / Function Generator

TABOR'S NEW WW WONDER WAVE SERIES



MODEL WW5062

- Dual-channel 50MS/s waveform generator
- Sine and Square waves to 25MHz
- 10 Built-in popular standard waveforms
- 14 Bit amplitude resolution
- 12 digits frequency resolution (limited by 1µHz)
- 512k standard waveform memory (1M option)
- 1 ppm clock accuracy and stability
- Comprehensive memory management, including segmentation and sequences
- AM, FM, Arbitrary FM, FSK, Ramped FSK modulation
- Linear and Logarithmic Sweep
- User friendly and menu driven 3.8" color LCD display
- Multi-Instrument synchronization
- DDS technology for extremely low phase noise signals
- Ethernet 10/100, USB 2.0 and GPIB interfaces
- ArbConnection software for easy waveform creation&control

Model 5062 represents the company's next generation of products in the field of function, pulse and arbitrary waveform generators. This instrument is superior and far more versatile than any existing equivalent weather it is an analog or digital product. As a waveform source, this model can replace analog generators in almost every application. The Instrument combines high-frequency performance, versatility and compact size in a boxed format. Featuring signal output in the range of 1µHz to 25MHz and 14-bit vertical DAC resolution and up to 1M arbitrary waveform buffer, these instruments exhibit performance and provide solutions to the most demanding test stimulus challenge.

Versatility
Four waveform types may be generated: standard, arbitrary, sequenced arbitrary, and modulated. It is virtually like having four different generators in a single, compact package.

As a Function Generator
Most applications require simple and controllable waveforms such as sine and square waves; these functions and more are resident in a built-in library and can be called to the output using simple and easy keystrokes. The built-in waveforms are generated digitally from lookup tables that ensure accuracy and fidelity. The use of DDS technology to generate the controlling clock enhances clock stability and thus provides jitter-free and excellent spectral purity. Sine and square waves can be generated at up to 25MHz. There are eight additional waveforms of which have controllable parameters, all accessible from the front panel.

Arbitrary Waveform Generator
Complex waveforms are used for testing purposes throughout the industry. While coordinates for such waveforms can easily be generated on paper or on computers, there is a need for digital instruments to take this data and convert it to electronical signals. An arbitrary waveform generator is about the only tool that can take a set of X-Y coordinates and convert them to real life signals.

Combined with the power of ArbConnection, there is no limit to what you can create and generate. Waveform coordinates can be imported from a variety of sources such as MathLab, ASCII files etc. Anything you can display on one of the composer screens is downloaded in split-second time and generated by the main output.

Waveform Memory for High Speed Testing
The instruments are sold with 512k waveform memory as standard. Optional 1M waveform memory is offered for applications requiring longer waveforms, placing the 5062 series in a far better position than its traditional competitors. The waveform memory is accessible from a remote host, using fast GPIB, USB or LAN interface thus minimizing test time needed when downloading multiple waveforms for one or more tests.

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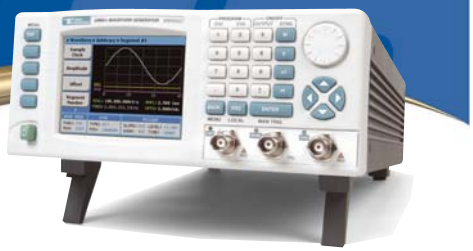

The entire space of the waveform memory is backed up by rechargeable batteries allowing waveforms to be downloaded in the lab and the generator moved to another location for field operation.

Sequence Generator

Memory management is a must in today's arbitrary waveform generators. While very few applications require one long memory, most of the waveforms require a limited number of horizontal points. As a sequence generator, the model 5062 lets you divide the entire memory into 2048 smaller segments, load each segment with a different waveform, and then, select the order in which these segments will be linked and the number of loops that each segment will perform. This allows test software to switch between many different waveforms rapidly and without having to download multiple times, enhancing test throughput in a way that cannot be duplicated by other competing products.

Modulation Capability

Agility and modulation capabilities open the door to diverse applications. In addition to the power to generate any shape and any style of waveforms with the arbitrary waveform generation power, the product can generate standard modulation schemes such as AM, FM, Arbitrary FM, FSK, and Linear and Logarithmic sweep, all of which are easily created and executed by the generator.

Flexible Triggering Capability

Continuity of signals is required in most application however, at times when single output cycles are required or synchronization to other devices is mandatory, the 5062 can be placed in different run mode that provides synchronization to other system components. Buit into the product are gated, triggered and burst modes of which the last two can be operated with the built-in, free-running trigger generator, when external stimulating devices are not available.

Easy to use

Large and user-friendly 3.8" back-lit color LCD display facilitates browsing though menus, updating parameters and displaying detailed and critical information for your waveform output. Combined with numeric keypad, cursor position control and a dial, the front panel controls simplifies the often complex operation of an arbitrary waveform generator.

High Speed Access

Access speed is an increasingly important requirement for test systems. Included with the instrument is a variety of interfaces: Ethernet 10/100, USB 2.0 and GPIB so one may select the interface most compatible to individual requirements. Using any of the external interfaces, controlling instrument function and features as well as downloading waveforms and sequences are fast, time saving and easily tailored to every system regardless if it is just a laptop to instrument or full-featured ATE system. IVI drivers and factory support will speed up system integration thus minimizing time-to-market and reduce system development costs significantly.

Multiple Environments to Write Your Code

Model 5062 comes with a complete set of drivers, allowing you to write your application in various environments such as: Labview, CVI, C++, VB, MATLab. You may also link the supplied dll to other Windows based API's or, use low level SCPI commands (Standard Commands for Programmable Instruments) to program the instrument, regardless if your application is written for Windows, Linux or Macintosh operating systems.

Precise Inter-Channel Phase Control

In the 5062, both channels share a common sample clock, and both channels are triggered from the same source assuring tightly synchronized channel-to-channel timing. Precise control over channel-to-channel phase offset is achieved by allowing control over channel start phase with a resolution down to as small as 1 waveform point. This enables extremely accurate timing or phase dependencies to be studied, such as those found in high speed digital communication systems.

MODULAR

Tabor's MODULAR software package gives wireless design and manufacturing engineers access to the most flexible signal generation tool in the market - the Arbitrary Waveform Generator (AWG). The AWG answers virtually all their test stimulus needs at baseband or IF/RF levels, whether required signals are analog or digital. With none of the limitations of traditional generators, Tabor's AWG allow any signal, simple or composed, clean or noisy, ideal or impaired, to be downloaded and played back.

ArbConnection

ArbConnection is a graphical tool that provides an unlimited source of Arbitrary Waveforms. With the ArbConnection software you can control instruments functions, modes and features. You can also create a virtually infinite amount of test waveforms. Freehand sketch allows you to draw your own custom waveform for quick analysis of analog signals. You can use the built-in equation editor to create your own exotic functions. Add or subtract components of a Fourier series to characterize digital or analog filters or inject random noise into a signal to test immunity to auxiliary noise.

Multi-Instrument Synchronization

Multiple 5062 can be synchronized using a Master-Slave arrangement allowing users to benefit from the same high quality performance in their multi-channels needs.

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Service and Support
Beyond providing precision Test & Measurement instruments, Tabor Electronics provides unparalleled service and support, and is continuously finding new ways to bring added value to its customers.

Our after-sales services are comprehensive. They include all types of repair and calibration, and a single point of contact that you can turn to whenever you need assistance. As part of our extensive support, we offer individualized, personal attention Help Desk, both online and offline, via e-mail, phone or fax.

Tabor Electronics maintains a complete repair and calibration lab as well as a standards laboratory in Israel and USA. Service is also available at regional authorized repair/calibration facilities.

Contact Tabor Electronics for the address of service facilities nearest you.

Applications
For expert technical assistance with your specific needs and objectives, contact your local sales representative or our in-house applications engineers.

Manuals, Drivers, and Software Support
Every instrument comes equipped with a dedicated manual, developer libraries, IVI drivers, and software. However, if your specific manual is lost or outdated, Tabor Electronics makes it possible to log-on to its Download Center and get the latest data “in a click”.

Product Demonstrations
If your application requires that you evaluate an instrument before you purchase it, a hands-on demonstration can be arranged by contacting your local Tabor Electronics representative or the Sales Department at our Corporate Headquarters.

Five-year Warranty
Every instrument from the Wonder Wave series comes with a five-year warranty. Each one has full test results, calibration certificate, and CD containing product's manual and complete software package. Our obligation under this warranty is to repair or replace any instrument or part thereof which, within five years after shipment, proves defective upon examination. To exercise this warranty, write or call your local Tabor representative, or contact Tabor Headquarters and you will be given prompt assistance and shipping instructions.

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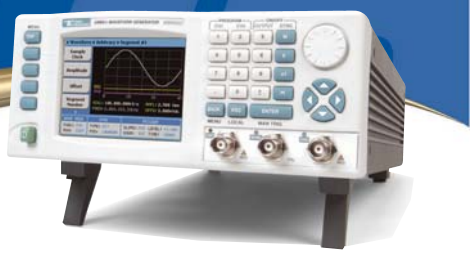

CHANNELS

Number of Channels: 2, semi-independent

INTER-CHANNEL CONTROL

LEADING EDGE OFFSET

Description: Channel 2 edge trails channel 1 edge by a programmable number of points.
Range: 0 to 512k points (1M option)
Resolution and Accuracy: 1 point, or 1 sample clock period of channel 2
Initial Skew: < ±2ns, with sclk divider = 1; < ±3ns, with sclk divider > 1

CHANNEL 2 SAMPLE CLOCK DIVIDER

Description: The sample clock source is common to both channels 1 and 2, however, the sample clock for the slave channel can be divided.
Range: 1 to 65,535 points
Resolution: 1 point

INTER-CHANNEL DEPENDENCY

Separate controls: Output on/off, amplitude, AM, offset, standard waveforms, user waveforms, user waveform size, sequence table, channel 2 clock divider, trigger start phase, breakpoints
Common Controls: Sample clock, frequency, reference source, trigger modes, sequence advance mode, SYNC output, FM, FSK, sweep, arm start/stop

STANDARD WAVEFORMS

Waveforms: Sine, Triangle, Square, Pulse, Ramp, Sinc (Sine(x)/x), Gaussian, Exponential, Repetitive Noise, DC.
Frequency Range: Waveform dependent
Source: Internal synthesizer

SINE

Frequency Range: 100µHz to 25MHz
Start phase: 0 to 360°

Harmonics Distortion (at 5Vpp):

DC to 1MHz	-50dBc
1 to 5MHz	-45dBc
5 to 10MHz	-35dBc
10 to 25MHz	-28dBc

Non-Harmonic Distortion:

DC to 9MHz	-60dBc
9 to 50MHz	-50dBc

Total Harmonic Distortion:

DC to 100kHz	0.1%

Flatness (1kHz):

DC to 25MHz	5%

TRIANGLE

Frequency Range: 100µHz to 7.5MHz
Start phase: 0 to 360°

SQUARE

Frequency Range: 100µHz to 25MHz
Duty cycle: 1% to 99%
Rise/Fall time: <10ns, typically < 8ns
Aberration: <5%

PULSE

Frequency Range: 100µHz to 7.5MHz
Delay, Rise/Fall Time, High Time Ranges: 0%-99.9% of period (each independently)
Rise/Fall time: <10 ns, typically < 8ns
Aberration: <5%

RAMP

Frequency Range: 100µHz to 7.5MHz
Delay, Rise/Fall Time Ranges: 0%-99.9% of period (each independently)

SINC (SINE(x)/x)

Frequency Range: 100µHz to 3.125MHz
"0" Crossing: 4 to 100 cycles

GAUSSIAN PULSE

Frequency Range: 100µHz to 3.125MHz
Time Constant: 1 to 200

EXPONENTIAL FALL/RISING PULSE

Frequency Range: 100µHz to 3.125MHz
Time Constant: -100 to 100

REPETITIVE NOISE

Bandwidth: 25MHz

DC

Range: -100% to 100% of amplitude

ARBITRARY WAVEFORMS

Sample Rate: 100mS/s to 50MS/s
Vertical Resolution: 14 Bits
Waveform Memory: 512k points standard (1Meg option)

MEMORY SEGMENTATION

No. of Segments: 1 to 2048
Min. Segment Size: 16 points
Resolution:: 4 points size increments from 16 to 512k points (1Meg option)

SEQUENCED ARBITRARY WAVEFORMS

Operation: Permits division of the memory bank into smaller segments. Segments may be linked, and repeated in user-selectable fashion to generate extremely long waveforms.

ADVANCE MODES

Automatic Sequence Advance: No triggers required to step from one segment to the next. Sequence is repeated continuously through a pre-programmed sequence table
Stepped Sequence Advance: Current segment is sampled continuously, external trigger advances to next programmed segment. Control input is TRIG IN connector.
Single Sequence Advance: Current segment is sampled to the end of the segment including repeats and idles there. Next trigger advances to next segment. Control input is TRIG IN connector.
Mixed Sequence Advance: Each step of a sequence can be programmed to advance either: a) automatically (Automatic Sequence Advance), or b) with a trigger (Stepped Sequence Advance)

Advance Source: External, rear panel BNC; Internal; GPIB
Sequencer steps: From 1 to 2048
Segment loops: From 1 to 1Meg
Minimum Segment Duration: 1µs for more than one loop.

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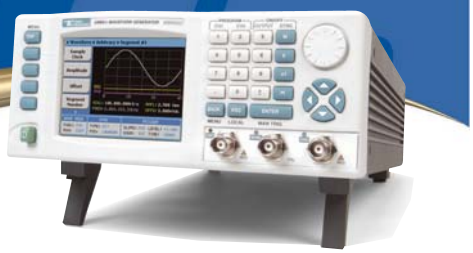

COMMON CHARACTERISTICS

FREQUENCY

Resolution: 12 digits limited by 1µS/s
Accuracy & Stability: Same as reference

10MHz REFERENCE CLOCK

Internal	0.0001% (1ppm TCXO) initial tolerance over a 19°C to 29°C temperature range; 1ppm/°C below 19°C and above 29°C; 1ppm/year aging rate
External	10MHz TTL, 50% ±2% duty cycle

AMPLITUDE

Range: 10mV to 10Vp-p, into 50Ω; Double into open circuit
Resolution: 4 digits
Accuracy (1 KHz):

1.000V to 10Vp-p	±(1% + 25mV)
100mV to 999.9mVp-p	±(1% + 5mV)
10mV to 99.99mVp-p	±(1% + 2mV)

OFFSET

Range: 0 to ±4.5V Independent to amplitude setting as long as (amplitude/2) + (offset) does not exceed 5Vp-p
Resolution: 2.2 mV
Accuracy: ±1%

FILTERS

Type: 25MHz Elliptic
12.5MHz Elliptic

OUTPUTS

MAIN OUTPUTS

Connector: Front panel BNC
Stand-by: Output Off or Normal
Impedance: 50Ω, ±1%
Protection: Protected against temporary short to case ground

SYNC/MARKER OUTPUT

Connector: Front panel BNC
Impedance: 50Ω, ±1%
Level: >2 V into 50Ω, 4V nominal into 10kΩ
Validators: BIT, LCOM
Protection: Protected against temporary short to case ground
Position: Point 0 to n, Programmable with 4-point resolution
Width Control: Programmable
Range: 4 to 100000 waveform points
Resolution: 4 points
Source: Channel 1

SINEWAVE OUTPUT

Connector: Rear panel BNC
Impedance: 50Ω, ±1%
Level: 1V into 50Ω
Protection: Protected against temporary short to case ground
Source: Sample clock frequency
Frequency Range and Resolution: Same as Sample clock
Total Harmonic Distortion: 0.05% to 100 kHz
Harmonics and non-related spurious: < -30dBc to 50 MHz

SAMPLE CLOCK OUTPUT

Connector: Rear panel SMB
Level: ECL
Impedance: 50Ω, terminated to –2V

INPUTS

TRIG INPUT

Connector: Rear panel BNC
Impedance: 10kΩ, ±5%
Threshold Level: TTL
Min Pulse Width: 20ns
Slope: Positive or negative going edge.

10 MHz REFERENCE INPUT

Connector: Rear panel BNC
Impedance: 10kΩ, ±5%
Threshold Level: TTL
Duty Cycle: 50%, ±5%

AM INPUT

Modulation Input: Rear panel BNC
Impedance: 1MΩ, ±5%
Max Input Voltage: 12V

SAMPLE CLOCK INPUT

Connector: Rear panel SMB
Input Level: ECL
Impedance: 50Ω, terminated to –2V
Range: DC to 50MHz
Min. Pulse Width: 4 ns

SYNCHRONIZATION CONNECTOR

Connector: Rear panel 9-pin DSUB
Interconnecting Cable: Optional, consult factory at the time of purchase

MODULATION

Carrier Waveform: Sine, Triangle, Square, Pulse, Ramp, Sinc (Sine(x)/x), Gaussian, Exponential, Repetitive Noise, DC and Arbitrary waveforms
Run Modes: Continuous, Triggered, Burst and Gated
Trigger Advanced Mode: Automatic, Triggered, Gated or Software Command
Marker
Output & Level: Same as SYNC output.
Position: Programmable for selected frequency

FM

Carrier Waveforms: Sine, Triangle, Square, Pulse, Ramp, Sinc (Sine(x)/x), Gaussian, Exponential, Repetitive Noise, DC and Arbitrary waveforms
Carrier Frequency: Waveform dependent
Modulating Waveforms: Sine, Square, Triangle and Ramp
Modulation Source: Internal
Modulating Frequency: 1mHz to 100 kHz
Deviation Range: 100mS/s to 25MS/s
Frequency Distortion: <0.1%
Resolution: 12 digits, limited by 1µHz
Accuracy: 0.1%

ARBITRARY FM

Carrier Waveforms: Sine, Triangle, Square, Pulse, Ramp, Sinc (Sine(x)/x), Gaussian, Exponential, Repetitive Noise, DC and Arbitrary waveforms
Carrier Frequency: Waveform dependent
Modulating Waveform: Arbitrary waveformm, 10 to 20000 waveform points
Modulation Source: Internal
Modulating Waveform
Sample Clock: 1mS/s to 2MS/s
Deviation Range: 100mS/s to 25MS/s
Frequency Distortion: <0.1%
Resolution: 12 digits, limited by 1µHz
Accuracy: 0.1%

AM

Carrier Waveforms: Sine, Triangle, Square, Pulse, Ramp, Sinc (Sine(x)/x), Gaussian, Exponential, Repetitive Noise, DC and Arbitrary waveforms
Carrier Frequency: Waveform dependent
Modulation Source: External
Envelop Frequency: 1µHz to 500kHz
Sensitivity: 0V to +5V (5Vp-p) produce 100% modulation
Modulation Depth: 0% to 100%

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FSK

Carrier Waveforms: Sine, Triangle, Square, Pulse, Ramp, Sinc (Sine(x)/x), Gaussian, Exponential, Repetitive Noise, DC and Arbitrary waveforms
Carrier Sample Clock Range: 100mS/s to 50MS/s
Modulation Source: External, Rear panel Trigger input BNC.
Low level: Carrier sample clock
High level: Hop frequency
Baud Rate Range: 1bits/sec to 10Mbits/sec
Minimum FSK Delay: 1 waveform cycle + 50ns

RAMPED FSK

Ramp Time Range: 10µs to 1s
Resolution: 3 digits
Accuracy: ±0.1%

SWEEP

Carrier Waveforms: Sine, Square, Triangle, Ramp, Arb
Sweep Step: Linear, Logarithmic or Arb
Sweep Direction: Up or down
Sweep Range: 100mS/s to 50MS/s
Sweep Time: 1ms to 1000s
Resolution: 9 digits
Accuracy: ±0.1%

WIRELESS SIGNAL GENERATION

EVM (Error Vector Magnitude)

	0.1 MS/s	1 MS/s	5 MS/s
10 MHz	0.33%	0.60%	1.28%
20 MHz	0.36%	0.78%	1.50%

Test conditions:
Sample Clock Frequency = 50 MS/s
Sample Clock = Internal
Modulation = QPSK
Baseband Filter = Raised Cosine
Alfa = 0.35

ACLR (Adjacent Channel Leakage Power Ratio)

	0.1 MS/s	1 MS/s	5 MS/s
10 MHz	63 dB	62 dB	47 dB
20 MHz	56 dB	53 dB	45 dB

Test conditions:
Sample Clock Frequency = 50 MS/s
Sample Clock = Internal
BW = Symbol Rate;
Offset = 1.35 x Symbol Rate

TRIGGERING CHARACTERISTICS

System Delay: 3 to 4 Sample Clock+150ns
Trigger Start, Stop, Phase Control: 0 to 512k points (1M option)
Resolution: 4 points
Breakpoint Error: ±4 points
Breakpoint Source: External (Rear Panel Trigger Input BNC), Manual, or software command through Ethernet, USB or GPIB

EXTERNAL

Connector: Rear panel BNC
Level: TTL
Slope: Positive or negative
Frequency: DC to 2MHz
Impedance: 10kΩ, DC coupled

INTERNAL

Range: 100mHz to 2MHz
Resolution: 12 digits, limited by 1µHz
Accuracy: 0.1%

MANUAL

Source: Soft trigger command through the front panel or external interface

GATED MODE External signal enables generator. First output cycle synchronous with the active slope of the triggering signal. Last cycle of output waveform always completed

BURST

Waveforms: Sine, Triangle, Square, Pulse, Ramp, Sinc (Sine(x)/x), Gaussian Pulse, Exponential Fall, Rising Pulse, Noise, DC, Arb
Counted Burst Cycles: 1 to 1Meg, programmable
Source: Manual, Internal or External

MULTI-INSTRUMENT SYNCHRONIZATION

Description: Multiple instruments can be connected together and synchronized to provide multi-channel synchronization.

PHASE (LEADING EDGE) OFFSET

Description: Leading edge of master output trails the leading edge of the slave output by a programmable number of points. Each slave can be programmed to have individual offset.
Range: 0 to 512k points (1M optional)
Resolution and Accuracy: 4 point
Initial Skew: < ±15ns, depending on cable length and quality, typically with 0.5 meter coax cables

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DIGITAL PULSE GENERATOR OPTION

Channel Dependency:	Both channels share pulse parameters except level, polarity, delay and state
Pulse State:	On/Off
Pulse Mode:	Single or double, programmable
Polarity:	Normal, inverted or complemented
Period:	320 ns minimum, programmed with 4 ns increments
Pulse Width:	20 ns minimum, 1e3 Sec max.
Rise/Fall Time:	<8ns
High Time:	0 ns minimum, 1e3 Sec max.
Delay:	0 ns minimum, 1e3 Sec max.
Double Pulse Delay:	0 ns minimum, 1e3 Sec max.
Amplitude Window:	10mVp-p to 10Vp-p
Low Level	-5V to +4.990V
High Level	-4.990V to +5V

NOTES:

1. All pulse parameters, except rise and fall times, may be freely programmed within the selected pulse period provided that the ratio between the period and the smallest incremental unit does not exceed the ratio of 512,000 to 1. With the 1M option, the ratio is extended to 1,000,000 to 1, hence the specifications below do not show maximum limit as each must be computed from the above relationship.
2. Rise and fall times, may be freely programmed provided that the ratio between the rise/fall time and the smallest incremental unit does not exceed the ratio of 100,000 to 1.
3. The sum of all pulse parameters must not exceed the pulse period setting

GENERAL

Power Supply:	85 to 265V, 48 to 63Hz,
Power Consumption:	60W max
Display:	Color LCD, 3.8" reflective, 320 x 240 pixels, back-lit
Operating temperature:	0 - 50°C
Humidity (non-condensing):	11°C to 30°C: 85 % 31°C to 50°C: 75 %
Storage temperature:	-40°C to + 70°C.
Interface:	Ethernet 10/100, USB 2.0 and GPIB standard
Language:	IEEE-488.2 - SCPI – 1993.0
Dimensions:	212 x 88 x 415mm (WxHxD)
Weight:	Approximately 7 lb
Safety:	EN61010-1, 2nd revision
EMC:	CE marked. Designed to meet VDE 0411/03.81 and UL 1244
Reliability:	MTBF per MIL-HDBK-217E, 25°C, Ground Benign
Workmanship Standards:	Conform to IPC-A-610D
Supplied Accessories:	Power Cord, USB cable, CD containing Operating Manual, ArbConnection software and developer libraries.
Warranty:	5 years standard

ORDERING INFORMATION

MODEL	**WW5062**
50MS/s Dual-Channel ArbitraryWaveform Generator	

OPTIONS

1Meg:	1 Meg Memory

ACCESSORIES

Sync cable:	Sync cable for multi instrument synchronization
S-Rack mount:	19" Single Rack Mounting Kit
D-Rack mount:	19" Dual Rack Mounting Kit
Case Kit:	Professional Carrying Bag

Note: Options and Accessories must be specified at the time of your purchase.